



**US Army Corps
of Engineers**

Waterways Experiment
Station

DESCIM Strategic Plan

*by William A. Ward, Jr., University of South Alabama
Teri Shirnia, SRA International*

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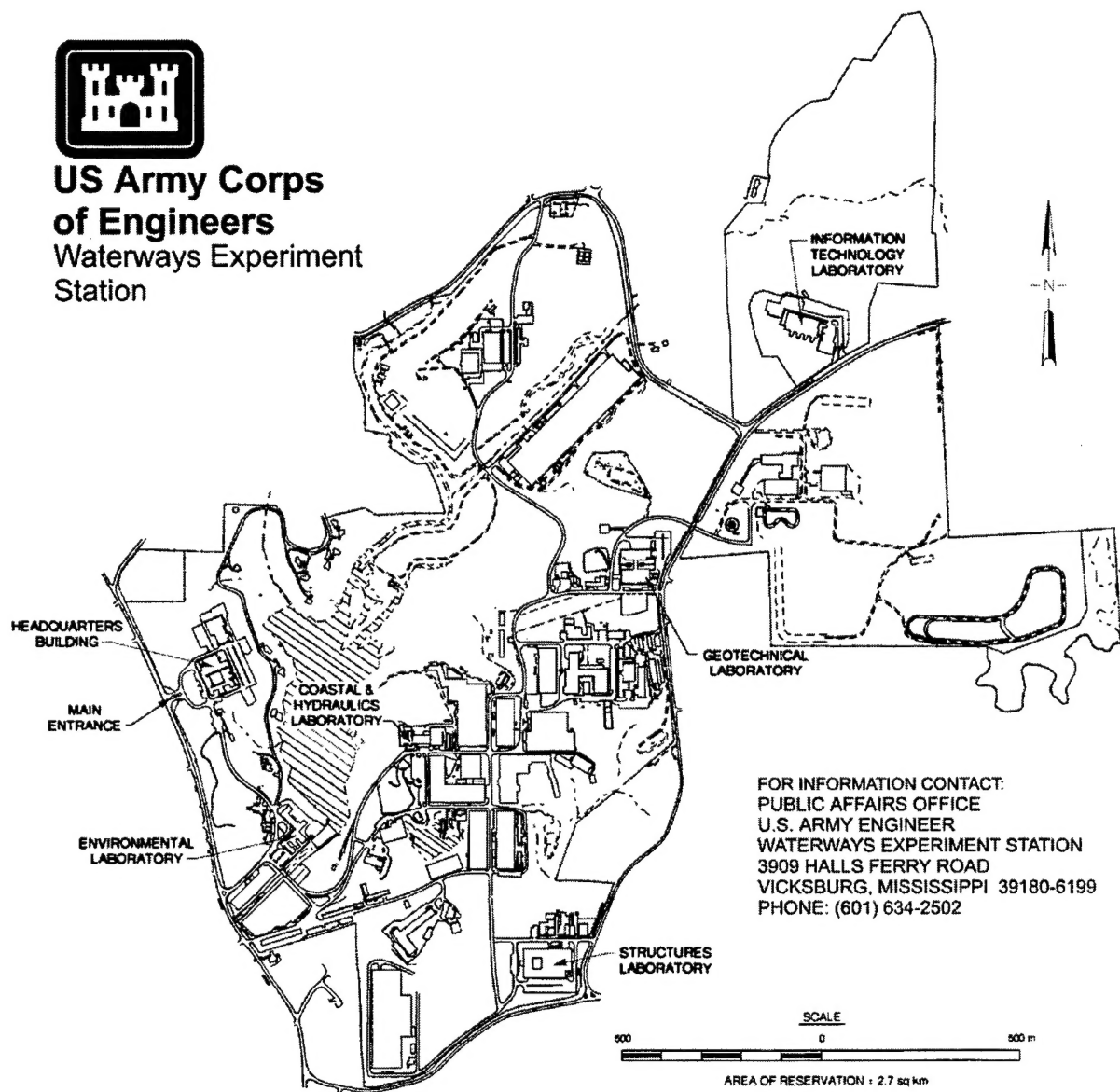
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Contents

Preface	v
1—Introduction	1
Purpose of DESCIM	1
DESCIM Planning Documents	2
Background	5
CIM initiative	5
Initiation of DESCIM	7
2—Mission and Vision	10
DESCIM Mission	10
Environmental Security mission statement	10
DESCIM mission statement	10
DESCIM Vision	11
DESCIM vision statement	11
Features of envisioned systems	11
Methods for implementing envisioned systems	13
3—Strategy	14
Goal 1: Field Standard Information Systems	14
What information systems are involved?	14
Supporting objectives	15
Strategies for accomplishing objectives	15
Performance measures	16
Goal 2: Share Standard Data Definitions	17
What is data standardization?	17
Supporting objectives	17
Strategies for accomplishing objectives	18
Performance measures	18
Goal 3: Support Improved Functional Processes	18
What is business reengineering?	18
Supporting objectives	20
Strategies for accomplishing objectives	20
Performance measures	20

4—Barriers and Benefits	22
Barriers to Success	22
Benefits	23
References	26
Appendix A: DoD Guidance for Information Management	A1
Structure of DoD Directives for IM	A1
Status of DoD IM and Related Guidance	A1

SF 298

List of Figures

Figure 1. Application of technical planning guidance	3
Figure 2. DESCIM planning documents	4
Figure 3. Principles of information management	6
Figure 4. DESCIM organizational chart	9
Figure 5. Information infrastructure benefits	24

Preface

This document is the strategic plan for the Defense Environmental Security Corporate Information Management (DESCIM) Program and was sponsored by Headquarters, U.S. Army Corps of Engineers, and monitored by the Information Technology Laboratory (ITL), U.S. Army Engineer Waterways Experiment Station (WES), under Contract No. DACA39-93-K-0016 from March 3, 1993 to August 31, 1998. The contract was monitored by Dr. Windell F. Ingram, Chief, Computer Science Division, ITL. Dr. N. Radhakrishnan was Director, ITL.

This report was prepared by Dr. William A. Ward, Jr., University of South Alabama, and Ms. Teri Shirnia, SRA International. DESCIM Program Manager was Mr. Warren Meekins.

Many individuals provided helpful information and feedback during the preparation of this report, but several deserve particular thanks because they reviewed a draft version in detail and provided constructive criticism. They are Mr. James S. Smith, ITL, Ms. Nicole Ritchie, Vector Research, Inc., and Mr. Scott Markert, former DESCIM Program Manager.

At the time of publication of this report, COL Robin R. Cababa, EN, was Acting Director, WES.

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1 Introduction

Purpose of DESCIM

Restoring and maintaining environmental quality is an increasing concern to the people of the United States. Congress has made that concern explicit through legislation which requires both industrial and Federal installations to meet higher and higher environmental standards. The military is not exempt from these requirements, and the various services have initiated environmental activities at many of their sites. The Defense Performance Review Environmental Security Committee (DPRESC) (1993) areas of activity include cleanup, conservation, compliance, explosives safety, pollution prevention, safety and occupational health, and environmental information technology. Monitoring the progress of these activities, measuring their success, and reporting project status to supervising agencies and legislators require gathering and managing a significant amount of data. Realizing that each of the Department of Defense (DoD) components were separately proceeding with the upgrade or creation of information systems to meet this need, the DoD decided to consolidate these activities into the Defense Environmental Security Corporate Information Management (DESCIM) program. This document is the strategic plan for that program.

This plan is one of a set of DESCIM planning documents; the next section of Chapter 1 describes them. Guidance for effectively applying information technology to DoD functional areas is provided by the ongoing Corporate Information Management (CIM) initiative, of which DESCIM is a part. Therefore, Chapter 1 also includes a summary of that initiative; this is followed by a brief historical synopsis of the initiation of the DESCIM program itself.

The primary purpose of this plan is to present the DESCIM mission, vision, goals, and objectives. In this context, the "mission" is DESCIM's assigned job as specified by DoD, while the "vision" is a concise statement of DESCIM's "ultimate attainment, viewed from long range."¹ Chapter 2 presents the mission and vision, enabling the reader to see DESCIM's ultimate destination. DESCIM "goals" are broadly stated milestones that must be reached to accomplish the

¹ See the definition of and synonyms for "intention" in *The American Heritage Dictionary of the English Language*, 1971, pp. 682-683.

mission; they are specified in Chapter 3. The plan concludes in Chapter 4 with a discussion of barriers to the success of the program and of the benefits obtained if the goals are reached.

DESCIM Planning Documents

The overall DoD information management planning structure is shown in Figure 1. The unshaded boxes indicate planning documents which are the responsibility of DESCIM. Figure 2 is a “zoom-in” of Figure 1 showing the relationships of the DESCIM documents to each other as well as to other significant DoD planning documents. Table 1 lists the issues addressed by each document and the level at which they are addressed.

- a.* The DESCIM Executive Summary gives a broad overview of the program and its importance to DoD, as well as its goals, accomplishments, and status. It is primarily intended for those unfamiliar with the program, such as new members of oversight agencies. Although primarily for external consumption, new DESCIM staff members will also benefit from reading it. Read the DESCIM Executive Summary before reading further in this document.
- b.* The DESCIM Strategic Plan (this document) provides more detailed information regarding the program's mission, goals, objectives, risks, and benefits than does the Executive Summary. Strategies for reaching the goals and ways to measure success form the core of this plan. The primary audience for this plan includes those directly involved with overseeing and managing DESCIM. DESCIM staff should also read it to get “the big picture” about the program. If you are already familiar with the DoD Corporate Information Management (CIM) initiative and the creation of DESCIM, skip the Background section in this Strategic Plan.
- c.* The DESCIM Migration Plan gives more detailed information than the Strategic Plan on how the transition from the large number of old “legacy” computer systems to the much smaller number of “migration” systems will be accomplished. This document provides guidance from DESCIM management to DESCIM staff regarding this transition. Read the Strategic Plan before reading the Migration Plan.
- d.* The DESCIM Data Integration Plan describes how standard data definitions will be identified and included in migrating and planned information systems. The primary audience here includes DESCIM staff members and system implementors. Read the Strategic Plan before reading the Data Integration Plan.
- e.* The DESCIM Technical Architecture Plan describes the architecture of the migrating and planned information systems; these systems include computers, computer networks, and software. This document provides

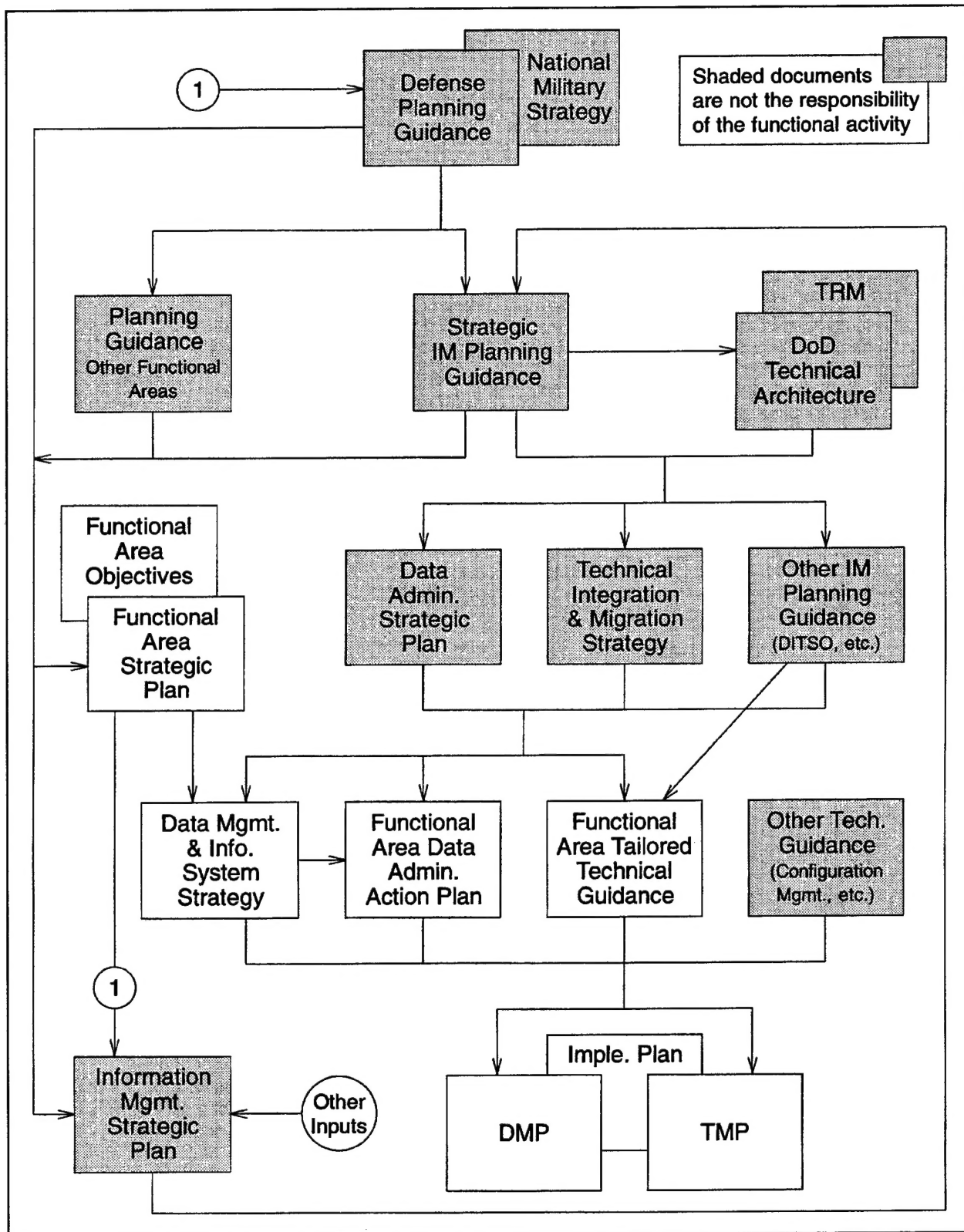


Figure 1. Application of technical planning guidance (from Director of Defense Information (1992))

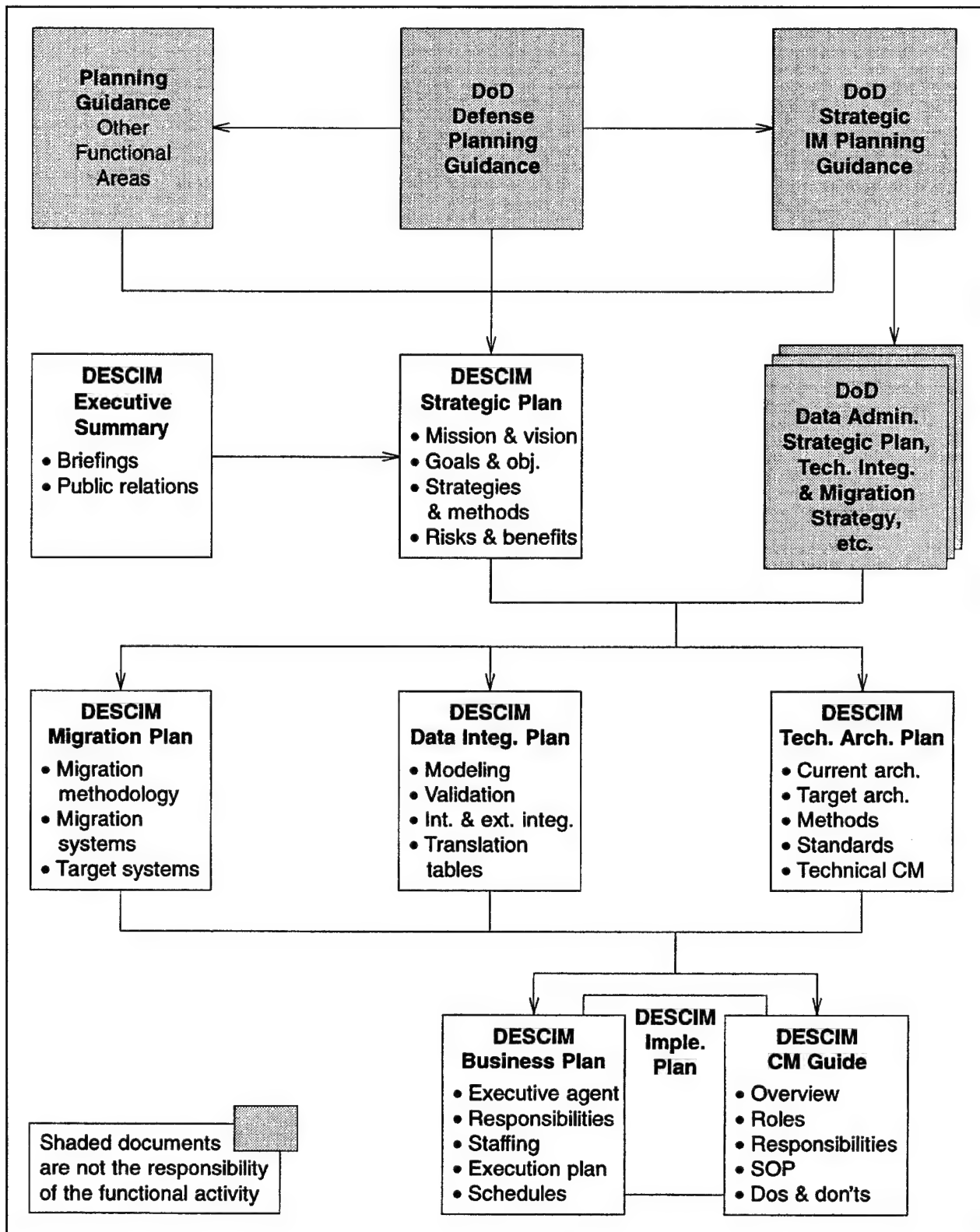


Figure 2. DESCIM planning documents

Table 1
Framework for DESCIM Strategic Planning

Document	Who	What	When	Where	Why	How	\$
Executive Summary	V	V			V	V	
Strategic Plan		H			H	H	
Migration Plan		D	H			D	
Data Integration Plan		D	H			D	
Technical Arch. Plan		D	H			D	
Business Plan	H		D	H			D
Config. Mgmt. Guide	H					D	
Note: V = very high level, H = high level, D = detailed level							

technical guidance to anyone involved in the creation or modification of those information systems. Read the Migration Plan before reading the Technical Architecture Plan.

- f. The DESCIM Business Plan discusses issues related to the business operation of the program, including staffing, funding, and responsibilities. It is of primary interest to the DESCIM executive agent, the DESCIM program manager, and those to whom they report. Read the Strategic Plan before reading the Business Plan.
- g. The DESCIM Configuration Management Guide documents the configuration management policies to be followed in managing the transition from legacy information systems to standard migration systems. Read the Migration Plan before reading the Configuration Management Guide.

Background

CIM initiative

The DoD, faced with constraints on its budget, is seeking ways to improve operations and manage resources more efficiently. The CIM initiative is a major part of that effort. DoD launched CIM in 1989 as a way to improve functional processes, make better use of information technology, and eliminate duplicative information systems across seven administrative areas (e.g., civilian payroll and materiel management). Accomplishing these objectives will not merely automate existing business activities or update or replace existing information systems. Instead, business methods and processes throughout DoD will be examined and, if necessary, restructured. This restructuring will be based on the information management (IM) principles shown in Figure 3.

1. Information will be managed through centralized control and decentralized execution.
2. Simplification by elimination and integration is to be preferred to automation whether developing new or enhancing existing information systems.
3. Proposed and existing business methods will be subject routinely to cost-benefit analysis which includes benchmarking against the best public and private sector achievement.
4. New business methods shall be proven or validated before implementation.
5. Information systems performing the same function must be common unless specific analysis determines they should be unique.
6. Functional management shall be held accountable for all benefits and all directly controllable costs of developing and operating their information systems.
7. Information systems shall be developed and enhanced according to a Department-wide methodology and accomplished in a compressed time-frame in order to minimize the cost of development and achieve early realization of benefits.
8. Information systems shall be developed and enhanced in the context of process models that document business methods.
9. The computing and communications infrastructure shall be transparent to the information systems that rely upon it.
10. Common definitions and standards for data shall exist DoD-wide.
11. Wherever practicable, information services shall be acquired through competitive bidding, considering internal and external sources.
12. Data must be entered only once.
13. Access to information shall be facilitated, and/or controlled and limited, as required. Information must also be safeguarded against unintentional or unauthorized alteration, destruction, or disclosure.
14. The presentation between the user and system shall be friendly and consistent.

Figure 3. Principles of information management (from Assistant Secretary of Defense (1992))

Initial DoD efforts to implement CIM focused on eliminating separate service systems and providing integrated systems across DoD (General Accounting Office (GAO) (1994a). Since that time, the CIM scope has broadened dramatically to include all DoD functional areas, including Environmental Security.¹ Standardization and improvement of DoD's supporting information systems remain major CIM objectives. By eliminating separate service information systems and providing integrated systems across the department, DoD expects to avoid the cost of developing and supporting redundant systems designed to perform the same basic functions. For example, each service had developed its own process and system for paying active military personnel. While there were procedural differences that had evolved among the services, there was no justification for the multiple systems that perform the same function (GAO 1994a).

Additional information on DoD's CIM initiative may be found in CIM planning documents ASD(C3I) (1994), CII DISA (1994), Deputy Secretary Defense (DSD) (1991), a status report (ASD(C3I) 1992), and the handbook by D. Appleton Company (1992). A list of documents providing guidance for information management is given in Appendix A; of particular interest is DoD Manual 8020.1-M (DDI 1992).

Initiation of DESCIM

General authorization for the DESCIM program area was contained in Defense Management Report Decision (DMRD) No. 920 on DoD environmental management approved by the Deputy Secretary of Defense (DSD) (1991b). This DMRD addressed the issue of developing "a comprehensive management strategy and system for implementing the DoD environmental mission." A number of initiatives were authorized in this decision, including establishment of a CIM effort for environmental information systems. Estimated expenditures for this effort were \$12.5 million for FY 92 and \$13.5 million per year for FY 93 through FY 97. The rationale for creating this environmental CIM program, as stated in DMRD No. 920 (DSD 1991b), was as follows.

The environmental area has significant data requirements for reporting, monitoring, etc., which require automation. Military Departments and DoD components already have rudimentary reporting systems and they are all either planning to do a major upgrade of their current system (Army) or produce new systems (Navy and Air Force). Despite coordination within DoD, the Military Departments and DLA have not decided to adopt a single system or to develop an interoperable system. This is particularly crucial in successful implementation of the environmental program since installations may have more in common with another installation in the same state than with an installation in another state but in the same Service.

¹ "Environmental Security" is capitalized here and elsewhere in this document to emphasize the reference to that area of responsibility assigned to the Deputy Undersecretary of Defense (Environmental Security).

The environmental area requires a joint CIM effort to ensure that the automated systems for all environmental programs meet the mission and interoperability requirements established by the Department. All funds currently being expended to upgrade or develop DoD Component environmental information systems should be transferred from the Component budget to OSD. A CIM group should be established immediately upon approval of this DMRD by the USD(A&T) and the Director of Defense Information to accomplish the determination of automation requirements and the actual fielding of such systems as rapidly as possible.

While that decision authorized the initiation of an environmental CIM effort in a general sense, specific guidance for this effort (the DESCIM program) is contained in the "Environmental Corporate IM Charter" (ACE 1992). This charter specified the DESCIM mission, the responsibilities of the various stakeholders, component relationships, and estimates of staffing requirements and scheduled progress. The charter received de facto agreement from all participants, and the program was subsequently initiated.

The Army is the Executive Agent for DESCIM, the Services provide program office staff, and the Defense Information Systems Agency (DISA) Center for Enterprise Integration (CEI) provides technical support. The Environmental, Safety, and Occupational Health Policy Board, made up of senior officers and civilians, provides guidance and oversight to DESCIM. A chart illustrating these organizational relationships is shown in Figure 4.

The program is responsible for DoD information management in all areas of Environmental Security, including cleanup, conservation, compliance, explosives safety, pollution prevention, safety and occupational health, and environmental information technology. DESCIM is also responsible for sharing Environmental Security related information with other Government agencies.

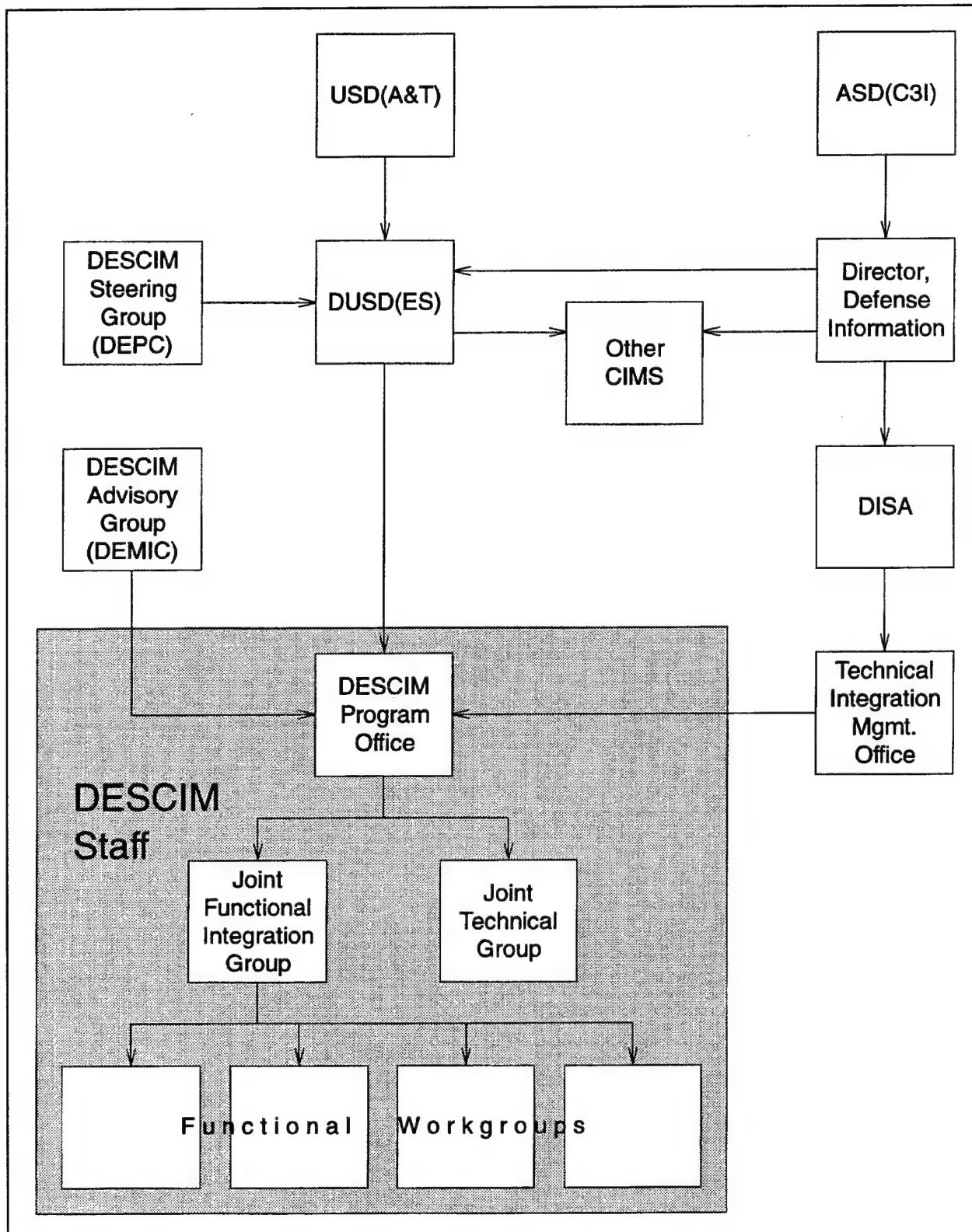


Figure 4. DESCIM organizational chart

2 Mission and Vision

DESCIM Mission¹

Environmental Security mission statement

The Office of the Deputy Undersecretary of Defense (Environmental Security) (DUSD(ES)) fosters an aggressive approach to DoD environmental programs that ensures responsible performance in defense operations. The DUSD(ES) mission is to strengthen national security by integrating environmental, safety, and health considerations into defense policies. DUSD(ES) objectives include the following.

- a.* Compliance of DoD operations with environmental, safety, and health laws.
- b.* Clean up and reduce risk from contaminated sites.
- c.* Conservation of resources DoD holds in public trust.
- d.* Pollution prevention at the source whenever possible.
- e.* Promote development of dual-use environmental technologies.
- f.* Safety and health protection of military personnel and civilians.

DESCIM mission statement

The DESCIM mission is to provide the information management support necessary to enable the Military Departments and DoD components to accomplish their missions, using the CIM initiative as a tool. Specifically, this support includes responding to installation commanders' requirements, migrating existing information systems, developing new target information systems, sharing data

¹ From DUSD(ES) (1995).

both within the Environmental Security community and externally, integrating Environmental Security systems with other DoD functional areas, and supporting improved functional processes. The DESCIM Program Management Office will assist the Military Departments and DoD components in accomplishing their Environmental Security missions more effectively and efficiently by achieving the following.

- a.* Providing Installation Commanders with tools to effectively sustain compliance while executing their mission.
- b.* Deploying efficient, integrated, and interoperable information management systems.
- c.* Sharing data among DoD Environmental Security professionals.
- d.* Sharing data with other components and Federal agencies.

Briefly stated, DESCIM's ultimate goal is to supply the information management infrastructure necessary to enable the Military Departments, DoD components, and DUSD(ES) professionals to effectively execute and manage the Environmental Security functional areas.

DESCIM Vision

DESCIM vision statement

The DESCIM vision is to provide responsive DoD environmental information systems that balance the needs of the individual services, are fully integrated with other DoD business processes, and, most importantly, provide the information necessary to DoD leadership and installation commanders for creating a healthy and safe environment at DoD installations. As a result, DESCIM will be recognized as a leader in the area of environmental information management.

Features of envisioned systems

DESCIM aims to provide information management tools that support stakeholders within and external to the DoD Environmental Security community. These stakeholders include warfighters, installation commanders, environmental professionals, and regulators. DESCIM envisions information systems providing, for instance, the exact location of where hazardous materials are stored and where cleanup projects are underway or are being monitored, the installation history on cleanup, compliance, pollution prevention, and preservation, and a record of the most recent audits and investigations. Installation commanders may use this information to re-prioritize the allocation of resources or to seek additional information on plans and programs to support decisions about installation operations.

DESCIM systems will provide for easy entry of data into a nationwide system, easy access to data by authorized users, shortened responses to problems, and improved business processes to save precious resources needed elsewhere in DoD. These capabilities will help mitigate the fears and concerns regarding compliance with environmental law, regulations, and policy. Commanders will be able to make intelligent business decisions regarding the use of available resources.

DESCIM sees this goal as being fulfilled via the implementation of three target systems by the year 2002. This implementation will take place in an evolutionary, incremental fashion. The first such target system is in the area of environmental reporting and compliance and is referred to as the Corporate Data Base System (CDBS). Version one of the CDBS will serve as a sort of “front-end” for existing information systems, including the Defense Site Environmental Restoration Tracking System (DSERTS), the A106 system (which collects and stores data required by Executive Order 12088 and OMB Circular A106), and Defense Environmental Management Information System (DEMIS). Version two will add support for additional existing systems. Finally, version three will complete the migration to the target by actually replacing those migration systems. The second target system will evolve from the Hazardous Substance Management System (HSMS) and will replace migration systems associated with technical aspects of pollution prevention. The third will replace migration systems associated with technical aspects of cleanup activities and will also evolve from existing cleanup migration systems. These envisioned systems will be implemented with the following features.

- a.* Interoperability, to ensure that information required by more than one DoD organization is shared appropriately between such organizations and to enable DoD and Federal, State, local, and international organizations to share information.
- b.* Quick responsiveness, to better enable DoD officials to meet urgent deadlines (e.g., for reporting, decision-making, testimony).
- c.* Wide breadth of data, to detail all pertinent information regarding Environmental Security assets, situations, response capability and responses, recommended procedures, hazardous materials, ongoing projects, budgetary actions, resources, and other relevant items.
- d.* Widespread access, with suitable controls, to provide information needed by the range of DESCIM customers, including installation authorities, environmental experts, review and oversight authorities, elected or appointed officials, and ultimately, the United States public.
- e.* Necessary security controls, to protect against unauthorized access while ensuring the availability, integrity, and confidentiality of information at all levels.

Methods for implementing envisioned systems

DESCIM information technology professionals will apply the following methods and principles to maintain and improve migration systems and to implement target systems.

- a.* Customer-led requirements to identify common functional processes, data definitions, information needs, system functionality, and user interfaces.
- b.* Structured techniques to capture the full range of cross-functional requirements and to identify and evaluate improvement opportunities.
- c.* Use of existing infrastructure where appropriate, to save time and money.
- d.* Iterative strategies for supporting migration and process improvements to minimize disruption to current operations, especially at the installation level, and to provide frequent opportunities for customer "buy-in."
- e.* Use of existing software where appropriate, to eliminate unnecessary expenditures on custom-developed products. Such software may be "commercial-off-the-shelf" (COTS) or "Government-off-the-shelf" (GOTS).
- f.* Compliance with information management standards, as defined by DoD's Technical Architecture for Information Management (TAFIM).
- g.* Single-point data entry and central data transfer and conversion.
- h.* Proven software engineering techniques and tools to implement the information systems.

In summary, the DESCIM program will enable dispatching of standards-based information management tools that support improved functional processes and utilize a set of common DoD data definitions. This will permit interoperability, integration, improved environmental compliance and management, and uncomplicated executive level reporting.

3 Strategy

DESCIM has three goals: implementation of standard Environmental Security information systems, sharing standard Environmental Security data definitions, and supporting improved functional processes. Each of these goals is discussed in the same manner. First, the issue the goal addresses is explained. Then, the goal is broken down into supporting objectives, or “subgoals.” Next, strategies for reaching these objectives are presented. Finally, ways to measure performance are discussed so that DESCIM's accomplishments with respect to that goal may be evaluated. Some performance measures are required by law (e.g., U.S. Congress 1995).

Goal 1: Field Standard Information Systems

What information systems are involved?

Many information systems within the DoD Environmental Security community perform the same function; there are duplicate computer systems for all functional areas reviewed by DESCIM. These systems were developed at different times by different organizations and involve different computer programs running on different types of computers. Because they are a sort of data processing inheritance from the past, they are referred to as “legacy systems.” Although some of these serve the same purpose, there are typically a few organization-specific features that make adoption of a single system for that functional activity difficult. Even when such consolidation is possible, there is organizational resistance because it results in a reduction in the organization's computer staff and a loss of control over the computer system in question.

DESCIM originally identified 1,766 environmental information systems. After a thorough review of their capabilities, this number was reduced to 357 “baseline” legacy systems. Many of these may be characterized as small, locally developed, microcomputer-based programs. A few of these programs are manually interoperable with other programs, but most operate in an isolated, stand-alone manner. A few of the programs are available throughout a single service, but most operate at the base level (i.e., at one or a few sites). In some cases, data are electronically transferred, but such processes were found to be unreliable and error prone.

To remedy this situation, DESCIM aims to identify existing environmental legacy systems that support the same business activity, pick a subset of those systems that do the best job, and then eliminate all but the subset. Ultimately, one of DESCIM's goals is to support functional experts in a reexamination of their functional processes and provide an information system to implement the new approach they have recommended. For that reason, the subset systems are termed "migration systems" because they will operate during the transition from the legacy systems to the ultimate "target systems." Further guidance on the migration process may be found in Brodie and Stonebraker (1995) and Ganti and Brayman (1995).

Supporting objectives

The supporting objectives are to:

- a.* Select migration systems.
- b.* Field migration systems.
- c.* Encourage elimination of corresponding legacy systems.
- d.* Consolidate migration systems into integrated target systems.

Strategies for accomplishing objectives

The strategies for accomplishing the objectives are to:

- a.* Develop a baseline of Environmental Security information systems.
- b.* Convene working sessions to determine functional requirements for Environmental Security information systems.
- c.* Evaluate legacy systems to identify which to migrate and which to phase out.
- d.* Continuously involve and coordinate with stakeholders throughout DoD during the migration system selection and approval process.
- e.* Solicit beta-test sites throughout DoD to obtain complete test coverage for the migration information systems.
- f.* Using beta-test results and system evaluations, enhance migration systems to support at least 80 percent of requirements.
- g.* Implement service-specific requirements into migration systems where appropriate.

- h.* Use state-of-the-practice software engineering techniques and tools to enhance and maintain the migration information systems.
- i.* Identify a person at each site who will be held accountable for fielding the migration system and phasing out the corresponding legacy system.

Performance measures

The performance measures follow; those required by law are indicated by an asterisk (*).

- a.* Number and percentage of migration systems at various phases of implementation: migrating or operational.*
- b.* Number and percentage of (1) legacy systems remaining to be eliminated and (2) legacy systems eliminated.*
- c.* Investment, cost savings, return-on-investment, and performance gains for migration systems selected and implemented.*
- d.* Number and percentage of migration systems that comply with technical infrastructure guidelines and standards for (1) operating systems, (2) communication protocols, and (3) database management systems.*
- e.* Number and percentage of integration decision papers approved by committees and principal staff assistants (relative to the total which must be approved).
- f.* Number and percentage of functional activities for which migration systems have been selected (relative to the total number of functional activities).
- g.* Number and percentage of migration systems fielded (relative to the total number of migration systems, not the number of installation sites).
- h.* Number and percentage of installations using a migration system (relative to the total number that could use it).
- i.* Number and percentage of installations that are using a migration system and have completely phased out their corresponding legacy system (relative to the total number that could use it).

Goal 2: Share Standard Data Definitions

What is data standardization?

Data standardization means using consistent definitions for the kinds of data manipulated by various computer programs. Just as a group of people cannot communicate unless they speak a common language, so a set of computer programs cannot interoperate and share data unless they use a standard set of data definitions. This can be something as simple as formatting the date in the same way (e.g., mm/dd/yyyy) across many application programs or agreeing to measure water discharge rates in thousands of gallons per minute. Obviously, the transition to a few migration systems and the development of target systems require that the Environmental Security community, and indeed all of DoD, agree on a standard set of such definitions.

The DESCIM Data Standardization project provides the detailed analysis necessary for integration of environmental data and activities into the DoD enterprise model. Data standardization is the foundation for DoD Environmental Security professionals to support the Environmental Security measures of merit, improve responsiveness to information requests, and gain access to quality data.

After the data definitions are standardized, these definitions, and ultimately the data itself, must be shared both within and outside of the Environmental Security community. Other CIM programs must share data with DESCIM and will require access to DESCIM data. For example, both the Logistics CIM program and DESCIM must share data related to the acquisition and tracking of hazardous substances. The DESCIM data standardization project supports this objective by identifying required interfaces and data exchanges among information systems, identifying single points of entry for data, and managing quality data.

The DESCIM data standardization project will result in cost avoidance through collection of consistently formatted information and the ability to more easily forward information up the chain for management and Congressional reporting. Collection and management of quality data result in increased efficiency.

Supporting objectives

The supporting objectives are to:

- a. Identify standard data for use in Environmental Security information systems.
- b. Collaborate with external organizations to identify standard data across functional boundaries.
- c. Use standard data in all Environmental Security information systems.

Strategies for accomplishing objectives

The strategies for accomplishing the objectives are to:

- a.* Convene working sessions to identify information needed to support each functional activity.
- b.* Develop data models for each functional activity and for migrating systems.
- c.* Identify candidate/approved/standard data definitions needed by and available for use in Environmental Security migration systems.
- d.* Submit data definitions for approval as DoD standards.
- e.* Provide physical representation of data to software engineers to implement standards into migration system data structures.

Performance measures

The performance measures follow; those required by law are indicated by an asterisk (*).

- a.* Number and percentage of approved Environmental Security data definitions (relative to the number requiring approval).*
- b.* Number and percentage of standard data definitions used in migration systems, either through the direct use of standard data definitions or by mapping nonstandard data to standard data.*
- c.* Number and percentage of migration systems using sharable databases.*
- d.* Number of nonstandard data definitions eliminated.
- e.* Number of external cross-functional data items used and shared.
- f.* Number of other CIM programs with which collaborative, cross-functional data standardization sessions have been held.
- g.* Total number of collaborative data standardization sessions held.

Goal 3: Support Improved Functional Processes

What is business reengineering?

Business reengineering, also known as functional process improvement (FPI), is “the fundamental rethinking and radical redesign of business processes to

achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service, and speed.” (Hammer and Champy 1993). Support for FPI comes in two forms (a) information systems (such as groupware, IDEF modeling tools, and planning aids) which support rethinking and redesign and (b) information systems which actually support the new business processes. DESCIM's mission is not to identify or institute improved functional processes; those activities are reserved for experts in the various areas of business activity. Rather, DESCIM is responsible for providing the two types of support noted above.

When discussing FPI, it is helpful to state what FPI is not. It is not automation, downsizing, reorganization, rightsizing, software reengineering, or total quality management, although those activities may ultimately be part of the process. Furthermore, “if a company falls 10% short of where it should be, that company does not need reengineering. More conventional methods, from exhorting the troops to establishing incremental quality programs, can dig a company out of a 10% hole.” (Hammer and Champy 1993). Reengineering is used when an organization is forced, by its customers, by its competitors, or by changes in its environment (e.g., funding levels), to adapt or die.

In its simplest form, FPI involves not improving existing functional processes, but examining why those practices are used at all. An organization should determine its ultimate objective in performing a particular activity and then discover an imaginative, new, streamlined way of reaching that objective. While DoD does not have competition in the same sense that a typical corporation does, it does have customers (the American public), and it is subject to change (e.g., the end of the Cold War and the resulting decrease in defense spending). Therefore there is the same powerful incentive to rethink the way DoD conducts its business.

An excellent example of this approach is given by Hammer and Champy (1993). While attempting to reduce its accounts payable staff of about five hundred by 25 percent, Ford discovered that Mazda's staff in this area was five employees! Instead of attempting to make the invoicing process more efficient, they discarded it all together. By creating a database of outstanding orders, a receiving clerk at the loading dock can determine if a newly arrived shipment is a valid delivery. If the shipment is in the database, payment is authorized and the computer sends the check; if it is not, delivery is refused. The old system of purchase orders, receiving tickets, invoices, suspense files, and so on was eliminated simply by taking a fresh approach to the process. Instead of following the traditional rule “Pay when you receive the invoice,” Ford now follows “Pay when you receive the goods.” In addition to Hammer and Champy's book, readers requiring further information on FPI may consult a GAO report on the subject (GAO 1994b).

Supporting objectives

The supporting objectives are to:

- a.* Provide information technology support that will help functional experts identify and prioritize opportunities for improving their functional processes. These functional processes may be within a particular functional area (e.g., storage tank management) or may span several functional areas (e.g., hazardous material management and acquisition). Examples of this type of support include software tools that facilitate group brainstorming and decision making, IDEF modeling, and project planning.
- b.* Provide information systems that will support the improvements identified above. Obviously, this requires working with experts and future systems users in the affected business areas to specify the capabilities of the supporting systems; this will help obtain acceptance of the systems.
- c.* Provide ongoing support services for the above information systems, particularly in the areas of system installation, user training, and configuration management.

Strategies for accomplishing objectives

The strategies for accomplishing the objectives are to:

- a.* Provide software and personnel to support functional personnel in efforts to improve their functional processes.
- b.* Involve the functional community when defining the capabilities of the supporting information systems.
- c.* Use state-of-the-practice software engineering techniques and tools to develop and maintain the supporting information systems.
- d.* Collect and apply lessons learned.

Performance measures

The performance measures follow; those required by law are indicated by an asterisk (*).

- a.* Total number of process improvement opportunities and number at various phases of implementation. This will also include evaluation of information such as investment, cost savings, return-on-investment, and associated performance gains.*
- b.* Implementation progress-process improvement workshops.*

- c.* Implementation progress-process improvement opportunities.*
- d.* Investment, cost savings, and return-on-investment for implemented process improvements.*
- e.* Cycle time reductions resulting from process improvements.*

4 Barriers and Benefits

Barriers to Success

The following paragraphs discuss barriers to the success of the DESCIM program.

- a. *Insufficient funding.* This is an annually recurring battle; success depends on the ability of DESCIM to demonstrate tangible progress, which in turn depends on the ability to effectively measure program performance.
- b. *Loss of key personnel.* DESCIM staff members are provided by the various DoD components and by contractors. The needs of these providing organizations periodically result in the reassignment of staff to other duties. Replacement staff require some time to familiarize themselves with DESCIM, thus slowing activities in one or more areas. Reassignment of the program manager would be an even more serious impediment to progress. Complete program documentation, including the planning documents described in the introduction, is necessary to familiarize new staff members and mitigate the loss of key personnel.
- c. *Insufficient interservice cooperation.* Replacement of service- and site-specific information systems by new, standard DESCIM systems will inevitably eliminate some activities (and perhaps job positions) in the affected organizations. It will also result in reduced control by these organizations of the new systems. It is easy to see how such a prospect may be negatively viewed and how it may degenerate into a turf battle. The services, as DESCIM's customers, must be continuously involved in the implementation of, and informed regarding the benefits of, the new systems.
- d. *Satisfaction with partial results.* There is a real danger that programs will be satisfied with reducing the number of information systems (Goal 1) and fail to obtain the greater savings obtainable by improving functional processes (Goal 3). Even if Goal 3 is addressed, there is a danger that only improvements within, as opposed to across, business areas will be instituted.

- e. *Lack of long-term commitment.* DoD undergoes a periodic turnover in top-level leadership. This inevitably leads to a short-term view of the returns from various programs and forces program management into a "crisis mode" of operation. In this context, the above risks are symptoms of this more serious risk. The CIM initiative in general, and DESCIM in particular, requires a commitment from DoD that spans decades. Continuity in program leadership, long-range planning by that leadership, and frequent documentation of results will be necessary to sustain progress.
- f. *Difficulty in obtaining accurate performance measurements.* It will be relatively easy to use yearly budgets to determine how much DESCIM costs. Determining how much DESCIM saves will be much harder because it will require estimating the costs associated with functional processes and information systems no longer in use. Measuring the value of increased availability and quality of data for planning and reporting purposes may be even more difficult.
- g. *Technical incompatibilities between systems.* Conflicting hardware and software requirements may slow the deployment of the selected migration systems. The selected migration systems will ultimately be replaced, in an incremental manner, by a smaller number of target systems. This replacement process may also be slowed by such conflicts.

Benefits

The following paragraphs discuss the benefits that can be obtained if the goals of the DESCIM program are reached.

- a. *Decreased cost.* Elimination of redundant information systems will eliminate the maintenance costs of the phased-out systems, while improved functional processes typically require fewer personnel. Furthermore, improved information infrastructure will have reduced maintenance costs and reduced training costs relative to the current systems (Figure 5).
- b. *Increased efficiency.* Personnel training and readiness will improve because personnel will be responsible for the operation and maintenance of a smaller number of standard systems.
- c. *Increased availability and quality of data.* Data items will be entered only once, saved in a single place, and be made available as required. Elimination of multiple copies of data, some of which might be erroneous, will improve data quality.

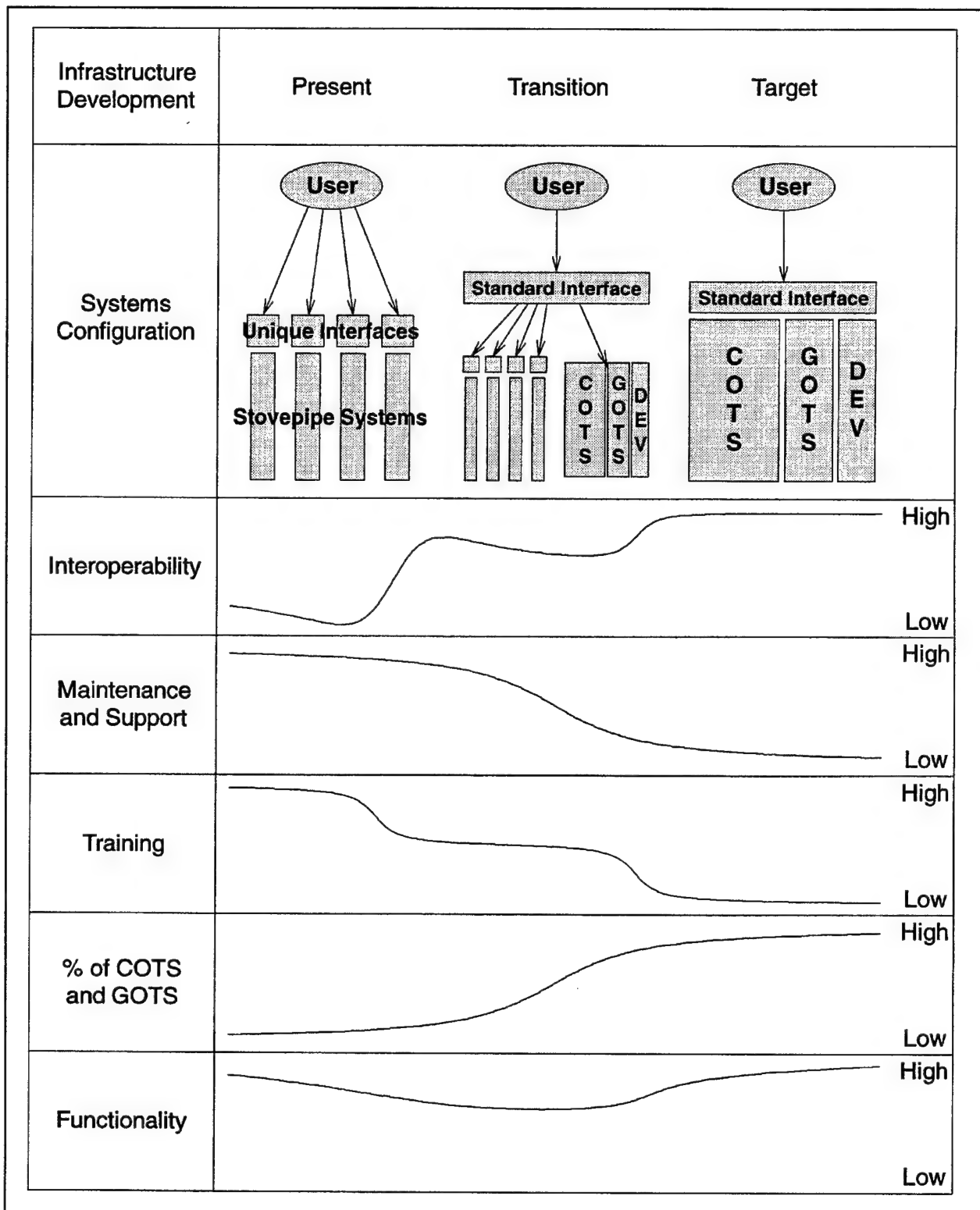


Figure 5. Information infrastructure benefits (after USD(A&T) 1994)

- d. *Improved environmental compliance.* Improved availability and quality of information will allow decision makers to address environmental issues in a more timely manner and adapt to cross-media enforcement, solving problems at an early stage before they reach crisis proportions.
- e. *Supports a transition from reactive to proactive environmental functional processes.* Improved compliance will allow DoD to reduce the amount of effort expended on cleanup prevention activities and focus more on pollution.

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Appendix A

DoD Guidance for Information Management¹

Structure of DoD Directives for IM

DoD 5025.1-I, "DoD Directives System Annual Index," January 1994, identifies subject numbers 8000-8999 for Information Management (IM). The subordinate subject headings listed below organize and classify Defense IM guidance:

8000-8999	Information Management
8000-8099	Defense Information Management
8100-8199	Information Systems
8200-8299	Information Services
8300-8399	Data Management
8400-8499	Information Technology
8500-8899	[Not Used]
8900-8999	Information Collection and Dissemination

As appropriate, existing directives, instructions, manuals, and other documents will transition to the new classification structure when they are updated. In some cases, related IM guidance will remain under their current subject headings.

Status of DoD IM and Related Guidance

The following list provides references and status for Defense information management program guidance as of August 1992.

¹ Adapted from Appendix L, DDI (1992).²

² References listed in this appendix are listed in the References at the end of the main text.

3400-3499 Computer Language

DoD Directive 3405.1, "Computer Programming Language Policy," April 2, 1987. Status: Supplemented by ASD(C3I) Memorandum, "Delegation of Authority and Clarifying Guidance on Waivers from the Use of the Ada Programming Language," April 17, 1992. Working group to be established to begin revision. Linda Brown, (703) 746-7928.

4600-4699 Countermeasures and Communications

DoD Directive 4630.5, "Compatibility and Interoperability of Tactical Command, Control, Communications, and Intelligence Systems," November 1992. Status: Current. E. Walke, (703) 695-2855.

DoD Directive 4640.13, "Management of Base and Long Haul Telecommunications Equipment and Services," December 5, 1991. Status: Current. D. Havlu, (703) 695-3136.

DoD Instruction 4640.14, "Management of Base and Long Haul Telecommunications Equipment and Services," December 6, 1991. Status: Current. D. Havlu, (703) 695-3136.

5000-5099 Acquisition and Administrative Management

DoD Directive 5015.2, "Records Management Program," March 22, 1991. Status: Being revised. H. Neeley, (703) 695-0970.

5100-5199 Organizational Charters

DoD Directive 5105.19, "Defense Information Systems Agency (DISA)," June 25, 1991. Status: Current. D. Clark, (703) 695-4281.

DoD Directive 5137.1, "Assistant Secretary of Defense for Command, Control, Communications, and Intelligence," February 12, 1992. Status: Current. D. Clark, (703) 695-4281.

5200-5299 Security

DoD Directive 5200.1, "DoD Information Security Program," June 7, 1982. Includes Change 1. Status: Current. F. Cook, (703) 695-2686.

DoD Regulation 5200.1-R, "Information Security Program Regulation," June 1986. Includes Change 1. Status: Current. D. Whitman, (703) 695-2686.

DoD Directive C-5200.5, "Communications Security (COMSEC) (U)," April 21, 1990. Status: To be incorporated into DoDD 5200.28. R. MacMillan, (703) 614-1802.

DoD Directive 5200.28, "Security Requirements for Automated Information Systems (AISs)," March 21, 1988. Status: Will be revised and expanded to include the requirements of DoDD 5200.5 and DoDD 5215.1. A draft will be available in April 1993. R. MacMillan, (703) 614-1802.

DoD Manual 5200.28-M, "ADP Security Manual," January 1973. Includes Change 1. Status: Under revision. R. MacMillan, (703) 614-1802.

DoD Standard 5200.28-STD, "Department of Defense Trusted Computer System Evaluation Criteria," December 1985. Status: Under revision. R. MacMillan, (703) 614-1802.

DoD Directive 5215.1, "Computer Security Evaluation Center," October 25, 1982. Status: To be incorporated into DoDD 5200.28. R. MacMillan, (703) 614-1802.

DoD Instruction 5215.2, "Computer Security Technical Vulnerability Reporting Program (CSTVRP)," September 2, 1986. Status: Under revision. R. MacMillan, (703) 614-1802.

5400-5499 Public Affairs

DoD Directive 5400.11, "Department of Defense Privacy Program," June 9, 1982. Status: Current. W. Cavaney, (703) 614-3027.

DoD Regulation 5400.11-R, "Department of Defense Privacy Program," August 1983. Status: Current. W. Cavaney, (703) 614-3027.

7700-7799 Information Resources Management

DoD Directive 7750.5, "Management and Control of Information Requirements," August 7, 1986. Status: Current. Dave Mullins, (703) 746-7919.

DoD Listing 7750.5-L, "Listing of Approved Recurring Information Requirements," July 1991. Status: Current. P. Rascoe-Harrison, (703) 746-0933.

DoD Manual 7750.5-M, "DoD Procedures for Management of Information Requirements," November 1986. Includes Change 1. Status: Current. W. Pearce, (703) 746-0933.

DoD Instruction 7750.7, "Forms Management Program," May 31, 1990. Status: Current. Tom May, (703) 746-7918.

DoD Listing 7750.7-L, "Listing of Approved Department of Defense (DD) Forms," July 1991. Status: Current. R. Sturgill, (703) 746-0932.

DoD Manual 7750.7-M, "DoD Forms Management Procedures Manual," August 1991. Status: Current. R. Sturgill, (703) 746-0932.

8000-8099 Defense Information Management

DoD Directive 7740.1, "DoD Information Resources Management Program," June 20, 1983. Status: Directive is to be incorporated into DoDI 8000.2. Tom May, (703) 746-7918.

DoD Directive 7740.2, "Automated Information System (AIS) Strategic Planning," July 29, 1987. Status: Directive is to be incorporated into DoDI 8000.2. Ken Glasser, (703) 746-7915.

DoD Instruction 7740.3, "Information Resources Management (IRM) Review Program," February 7, 1989. Status: Directive is to be incorporated into DoDI 8000.2. Tom May, (703) 746-7918.

DoD Instruction 7930.1, "Information Technology Users Group Program," March 25, 1986. Status: To be incorporated into DoDI 8000.2. Mike Noll, (703) 746-7132.

DoD Directive 8000.1, "Defense Information Management (IM) Program," October 27, 1992. Status: Current. Karen Mirabella, (703) 746-7903.

DoD Instruction 8000.2, "Defense Information Management (IM) Policies and Procedures," (draft). Status: Draft available for review September 1992. Karen Mirabella, (703) 746-7903.

DoD Instruction 8020.1, "Functional Process Improvement Program," August 1992. Status: Current. Bruce Lepisto, (703) 746-7901.

DoD Manual 8020.1-M, "Functional Process Improvement," August 5, 1992. Status: Approved as interim management guidance by DDI Memorandum, "Interim Management Guidance on Functional Process Improvement (DoD 8020.1-M)"; Change 1 (draft) was published in January 1993. Bruce Lepisto, (703) 746-7901.

8100-8199 Information Systems

DoD Guideline 7740.1-G, "Department of Defense ADP Internal Control Guideline," July 1988. Status: Current. Tom May, (703) 746-7918.

DoD Directive 7920.1, "Life-Cycle Management (LCM) of Automated Information Systems (AISs)," June 20, 1998. Status: Replaced by DoD Directive 8120.1 with the same title. COL Johnnie Rankin, (703) 746-7256.

DoD Instruction 7920.2, "Automated Information System (AIS) Life-Cycle Management Review and Milestone Approval Procedures," March 7, 1990. Status: Replaced by DoD Directive 8120.2 with the same title. COL Johnnie Rankin, (703) 746-7256.

DoD Manual 7920.2-M, "Automated Information System Life-Cycle Management Manual," March 1990. Status: To be revised following revision of DoDD 7920.1 and DoDI 7920.2. COL Johnnie Rankin, (703) 746-7256.

DoD Instruction 7920.4, "Baselining of Automated Information Systems," March 21, 1988. Status: To be incorporated into DoD Manual 7920.2-M. COL Johnnie Rankin, (703) 746-7256.

DoD Instruction 7920.5, "Management of End User Computing (EUC)," March 1, 1989. Status: To be incorporated into DoD Manual 7920.2-M. Dave Norem, (703) 746-7911.

DoD Instruction 7935.1, "DoD Automated Information System Documentation Standards," September 13, 1977. Includes Change 1. Status: A working group is meeting to consolidate and harmonize DoD-STD-7935A and DoD-STD-2167A. When these two standards are consolidated and approved in 1993, DoDI 7935.1 will be revised and re-published. Burt Newlin, (703) 746-7929.

DoD Directive 8120.1, "Life-Cycle Management (LCM) of Automated Information Systems (AISs)," January 14, 1993. Status: Current. COL Johnnie Rankin, (703) 746-7256.

8200-8299 Information Services

DoD Instruction 5160.49, "Defense Automatic Data Processing (ADP) Training and Civilian Career Development Coordination Program," November 28, 1980. Status: Current. Scarlett Curry, (703) 746-7909.

DoD Instruction 7930.2, "ADP Software Exchange and Release," December 31, 1979. Status: To be revised. Scarlett Curry, (703) 746-7909.

DoD Directive 7950.1, "Automated Data Processing Resources Management Program," September 29, 1980. Status: To be revised. Scarlett Curry, (703) 746-7909.

DoD Manual 7950.1-M, "Defense Automated Resources Management Manual," September 1988. Status: Current. Scarlet Curry, (703) 746-7909.

8300-8399 Data Management

DoD Instruction 5000.12, "Data Elements and Data Codes Standardization Procedures," April 27, 1965. Status: Replaced by DoD Manual 8320.1-M-1. Bob Molter, (703) 746-7926.

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DoD Directive 8320.1, "DoD Data Administration," September 26, 1991. Status: Current. Tom Bozek, (703) 746-7930.

DoD Manual 8320.1-M-1, "Standard Data Element Development, Approval, and Maintenance Procedures," (draft). Status: Currently in staffing. Bob Molter, (703) 746-7926.

8900-8999 Information Collection and Dissemination

None.

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13. (Concluded).

c. Of the improvement plans tested, the channel and sand trap configuration of Plan 14 appeared to be optimal with respect to all wave conditions from all directions. Navigation conditions in the entrance will be improved, and the plan will have no negative impact on the existing structures or the spit between the south breakwater and the groin.

d. Sediment tracer tests indicated that sediment moving in the predominant northerly direction will deposit in the deepened entrance channel and sand trap area of Plan 14 as desired, and material moving in the southerly direction will deposit in the deepened entrance channel.

e. The -30-ft entrance channel of Plan 15 will result in similar wave conditions for operational and extreme waves as the -40-ft channel of Plan 14, which would be acceptable with regard to entrance conditions and would have no negative impact on the breakwaters and spit area.